



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Research and Technology for Aerospace Propulsion Systems (RTAPS)

Industry Day Presentation

June 26, 2009

Marriott Hotel

Cleveland, Ohio



Industry Day Procedures

- Government will present RTAPS Overview
 - ◆ Opportunity for questions upon conclusion
 - General Question and Answer session.
- Interested prime/subs/team will then be given opportunity for one on one meeting with GRC for 10 minutes.



Industry Day Agenda

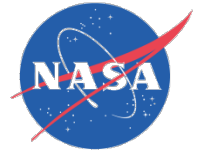
- Objective of RTAPS Industry Day
- Background
- RTAPS Technology Areas Overview
- RFP overview
- Proposal preparation
- Task order process
- Questions



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

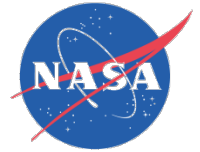
Objective of RTAPS Industry Day

The objective of the industry day is to provide potential bidders a consistent understanding of the RTAPS intent and content and to provide potential bidders a forum for their questions to be answered.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

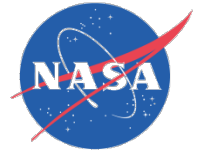
Background



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – What is RTAPS?

- RTAPS is a competitive task-order contract instrument for the research, design, and development of advanced aerospace propulsion technologies
- RTAPS is structured to support NASA's on-going, long-term aerospace research programs addressing a wide variety of propulsion issues.
- RTAPS is **Not** a new Program or Project.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements

Aeronautics Research Mission Directorate (ARMD)

- Subsonic Fixed Wing Project
- Environmentally Responsible Aviation Project
- Subsonic Rotary Wing Project
- Supersonics Project
- Hypersonics Project
- Aviation Safety Projects

Exploration Systems Mission Directorate (ESMD)

- Exploration Technology Development Program (ETDP)



Research & Technology for Aerospace Propulsion Systems

Background – NASA Program Requirements

ARMD – Subsonic Fixed Wing & Environmentally Responsible Aviation



- High-power density engine cores & fans
- Low emissions combustor and alternative fuels
- Low noise propulsion technologies
- Highly integrated propulsion and airframe systems, including but not limited to embedded engines
- Systems analysis
- Advanced materials, such as highly loaded disk, CMC components, etc



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements

ARMD – Subsonic Rotary Wing



- High-efficiency high-power density engine component technologies for Rotorcraft
- Wide operability engines
- Oil-free engine technologies for Rotorcraft engines
- Integrated engine – transmission system technologies for 50% main rotor speed reduction
- Variable speed transmission technologies for Rotorcraft



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements

ARMD – Hypersonics

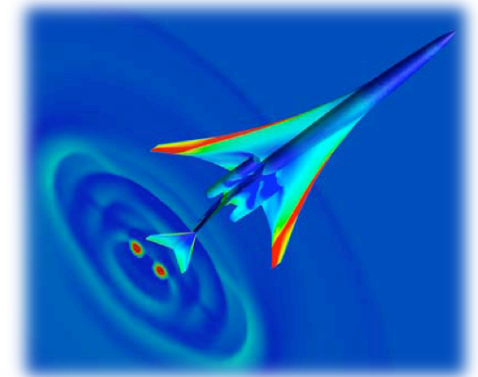


- High mach turbine engines with wide operability fans, inlet-fan interaction
- Combined cycle operability & performance including mode transition
- Design studies on thermal management, propulsion flow path, etc
- CFD analysis and studies
- Combustion physics including injector design & flame holding for hydrogen and Hc endothermic fuels
- High-temperature metals & composites development and testing
- Integrated Systems Analysis and Design



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements



ARMD – Supersonics

- Systems analyses with emphasis on highly integrated propulsion/airframe systems for low-boom, high efficiency, etc
- Advanced propulsion system concepts, components & technologies
- Lightweight, durable propulsion systems & components, such as lightweight containment systems, hot-section component life prediction, high-temperature materials, heat transfer & cooling technology
- Validated design & analysis tools
- System/subsystem validations of supersonic propulsion concepts



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements

ARMD – Aviation Safety

Development and demonstration of advanced engine health management technologies

Automated detection, diagnosis and prognosis of propulsion system adverse events resulting from system or component faults due to damage, degradation, or environmental hazards that occur during flight

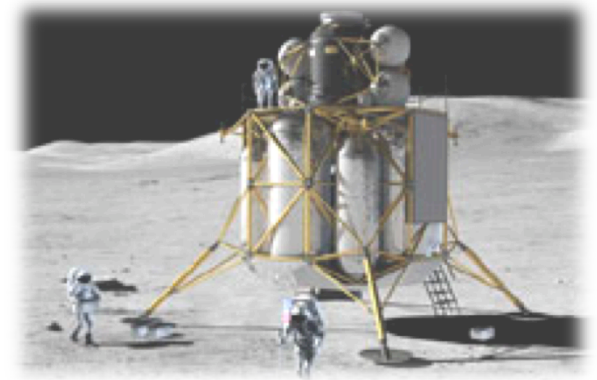


Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

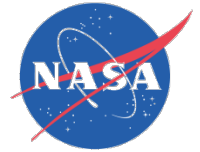
Background – NASA Program Requirements

ESMD - Space Propulsion – ETDP/PCAD

(Propulsion and Cryogenic Advanced Development)



- Advanced LOX/LCH₄ main and reaction control thruster technologies with reliable ignition, light weight, high specific impulse, and stable combustion
- Throttleable LOX/LH₂ Altair Decent engine technologies with high performance, reliable ignition
- Advanced regeneratively cooled LOX/LCH₄ main engine thrust chamber technologies with reliable ignition, fast start, stable and effective regen cooling, stable combustion, very high specific impulse performance



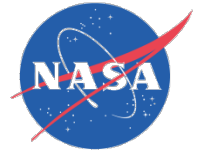
Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Background – NASA Program Requirements

ESMD - Space Propulsion – ETDP/CFM (Cryogenic Fluid Management)



- Efficient, long duration in-space storage of cryogens
- Low gravity cryogenic fluid management, such as propellant management devices, baffles, predictive analytical tools
- Reliable, accurate propellant gauging technologies for settle propellant and low-g environments
- Thermally efficient feed-lines to deliver single phase fluid to thrusters



RTAPS Technology Areas Overview



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RTAPS Major Technology Areas

Technology Area 1:

Air Breathing Engine Technology

Technology Area 2:

Propulsion Airframe Integration – Airframe Systems
Technology

Technology Area 3:

Integrated Rotorcraft Propulsion – Airframe Systems
Technology

Technology Area 4:

Space Propulsion Systems



Scope of Work

Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Technology Area 1: Air Breathing Engine Technology

Overview: *Development and demonstration of advanced turbine engine technologies that will enable revolutionary improvements in emissions, noise, capacity and safety with increased operating efficiency and reduced fuel consumption*

Focus of Tech Area 1 includes:

- Concept Development & Systems Studies
- High Power Density Engine Turbomachinery
- Advanced Combustors and Alternative Fuels
- Low Noise Propulsion Technologies
- Inlets and Nozzles
- Variable and Hybrid Engine Systems
- Integrated Component Technology Demonstrations
- Engine Icing
- Materials and Structures
- Instrumentation, Controls and Communication



Scope of Work

Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Technology Area 2: Propulsion Airframe Integration – Airframe Systems Technology

Overview: *Development and demonstration of advanced technologies to improve and optimize overall integrated propulsion - airframe system performance, weight, emissions, safety, fuel burn, noise, life, and efficiency*

Focus of Tech Area 2 includes:

- Concept Development & Systems Studies
- Airframe Integrated Inlets, Engines, & Exhaust Nozzles
- Airframe Icing



Scope of Work

Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Technology Area 3: Integrated Rotorcraft Propulsion – Airframe Systems Technology

Overview: *Development and demonstration of advanced integrated propulsion – airframe technologies to enable future rotorcraft to obtain high cruise speed, large payload and long range capability, and ultra-safe and low noise operations that will be required of next generation vertical lift civil transport systems*

Focus of Tech Area 3 includes:

- Concept Development & Systems Studies
- Advanced Transmission Technologies
- Integrated Propulsion System Technologies
- Rotorcraft Icing
- Rotorcraft Health Management Technologies



Scope of Work

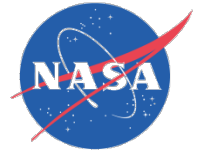
Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Technology Area 4: Space Propulsion Systems

Overview: *Development of advanced space propulsion technologies to enable missions with higher performance, reduced cost, improved reliability, and improved safety. Technical challenges will be addressed in alternate propellants, thruster performance, novel concepts, thermal control, cryogenics, propellant and combustion product properties, chemistry, and fluid dynamics, and advanced concept fabrication.*

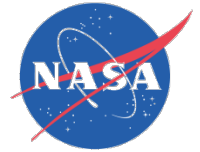
Focus of Tech Area 4 includes:

- Propulsion System Design and Trade Studies
- Non-Toxic Chemical Propulsion Systems
- Hypergolic Propulsion Systems
- Propellant Systems
- Electric Propulsion
- Rocket-Based Combined Cycle Propulsion Systems



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview - Technology Areas

- Technology Area 1: Air Breathing Engine Technology
- Technology Area 2: Propulsion Airframe Integration –
Airframe Systems Technology
- Technology Area 3: Integrated Rotorcraft Propulsion
- Airframe Systems Technology
- Technology Area 4: Space Propulsion Systems.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview- Statement of Work and Sample Tasks

- Scope of technology areas are described in Section C (SOW) and describe the scope of the work permitted under the contract. Offerors to address all elements in the SOW for each technology area proposed.
- Representative sample tasks in each area are described in Section L. Sample tasks will be used to evaluate the proposers ability to perform the Statement Of Work. (Attachment L1-L-4)
- Sample tasks are not task orders and are not being issued when the contracts are finalized.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview - SOLICITATION PROCESS

- **Proposers may bid on one or more Technology Areas.**
 - ◆ All elements and sample tasks under a technology area must be addressed.
 - ◆ Each Technology Area will be evaluated and scored independently.
 - ◆ Successful Offeror May Be Awarded One or More Technology Areas depending on Areas Proposed.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview - Contract Type

- Indefinite Delivery/Indefinite Quantity (IDIQ)
 - ◆ Task Orders
 - Fixed Price
 - Cost Reimbursement
 - Cost Sharing



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview - Contract Awards

- Multiple contracts to be awarded per Technology Area
 - ◆ Contractor will be eligible to compete for future task orders in the area or areas in which contractor received an award.
 - ◆ Example: If contractor is awarded for Technology Areas 1 and 3, contractor cannot compete for tasks in Technology Areas 2 and 4.



Research & Technology for Aerospace Propulsion Systems

RFP Overview - Anticipated Maximum Contract Value *

| <u>Technology Area</u> | <u>Est. Max. Value</u> |
|--|------------------------|
| • Air Breathing Engine Technology | \$125M |
| • Propulsion Airframe Integration – Airframe Systems Technology | \$12M |
| • Integrated Rotorcraft Propulsion – Airframe Systems Technology | \$4.5M |
| • Space Propulsion Systems | \$ |

* It is anticipated that multiple contracts will be awarded as a result of this RFP. Maximum value is dependant on the number of technologies selected, but cannot exceed \$ 191.5 M

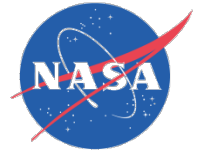


Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

RFP Overview - Evaluation Criteria

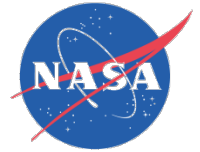
- The RTAPS evaluation will have three factors:
 - ◆ Mission Suitability
 - ◆ Cost/Price
 - ◆ Past Performance

- Mission Suitability is the most important factor and is more important than Past Performance and Cost. Mission Suitability and Past Performance when combined are more important than Cost.



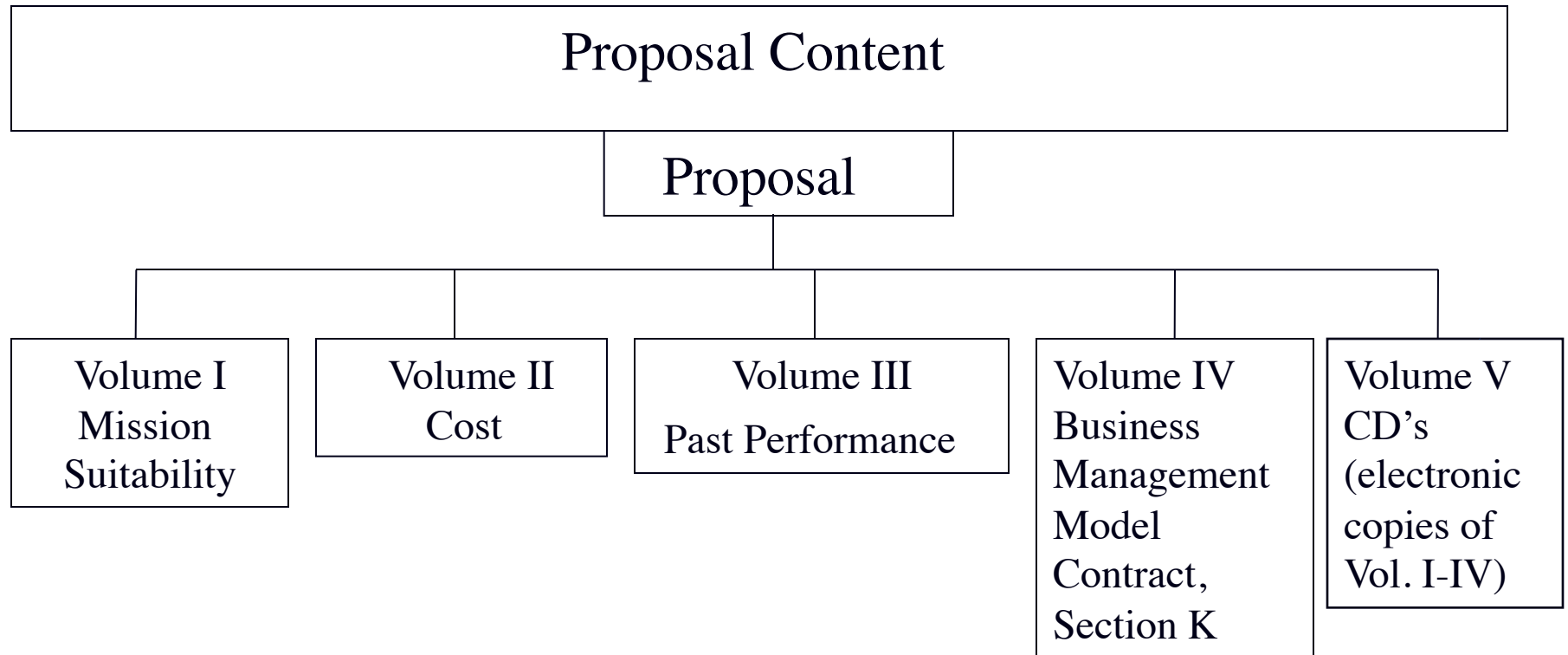
Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

PROPOSAL PREPARATION



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation





Research & Technology for Aerospace Propulsion Systems

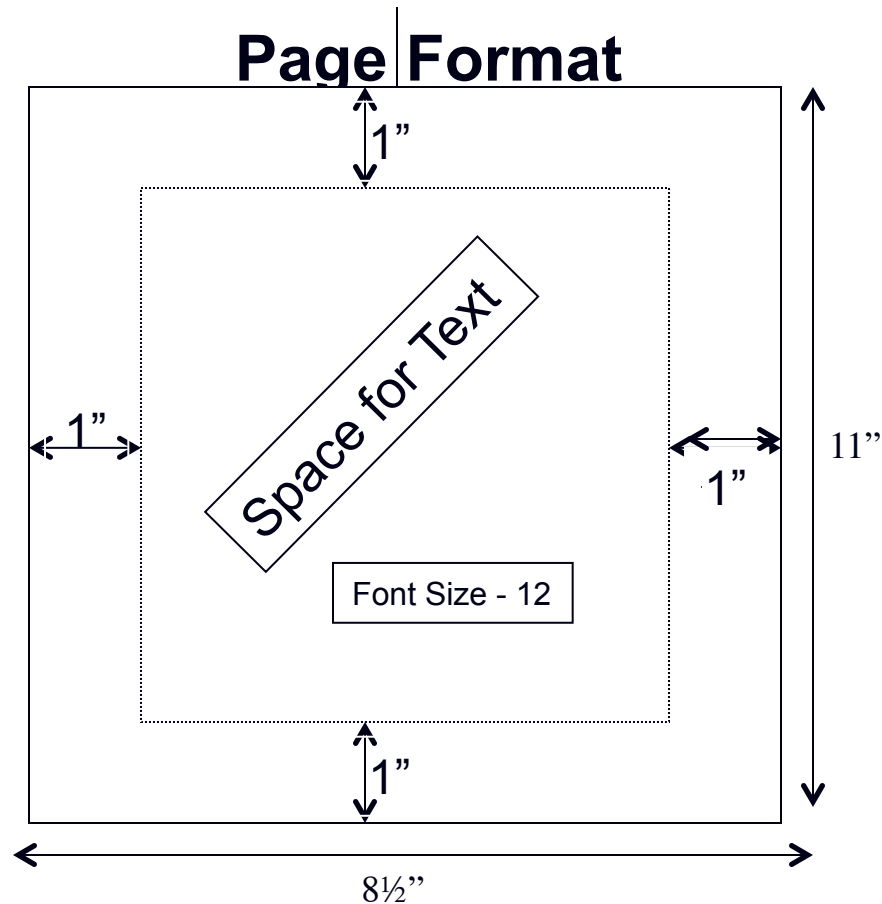
Page Limits

* **Note:** Mission Suitability page limits include response to respective sample tasks

| Volume | | Volume Title | | Page Limit |
|--------|--|---|--|---|
| I | | Mission Suitability – Technology Area 1 | | 150* |
| I | | Mission Suitability –Technology Area 2 | | 70* |
| I | | Mission Suitability – Technology Area 3 | | 85* |
| I | | Mission Suitability – Technology Area 4 | | 110* |
| I | | Individual Sample Task Response | | 10* |
| I | | Technical Summary | | 300 words See L-22 Not in page Limit |
| I | | Letters of Intent with Major Subcontractors | | No Limit |
| I | | Government Property Information L20 | | No Limit |
| I | | Safety & Health Plan | | No Limit |
| I | | Small and Small Disadvantaged Business Subcontracting Plan and Attachment L-5 | | No Limit |
| II | | Price/Cost | | No Limit |
| III | | Past Performance | | 15 |
| IV | | Business Management | | 5 |
| IV | | Signed Model Contract, SF 33 and Section K Certifications | | No Limit |
| V | | All CD's submitted in this Volume V | | No Limit |



Research & Technology for Aerospace Propulsion Systems



- Foldouts count as equivalent number of "8 ½ X 11" pages.
- Separators (e.g., tabs and titles) will not be counted as page.
- Summary addendums will not be counted as page.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation - Mission Suitability Volume I (See Provision L.25)

- Mission Suitability consists of three sub-factors:
 - ◆ Subfactor 1: Understanding Technical Requirements - **700** points
 - Technical Approach to Technology Area in Statement of Work - 400 Points
 - Technical Approach to Sample Tasks - 300 Points
 - ◆ Subfactor 2: Management Plan and Approach - **200** points
 - ◆ Subfactor 3: Small Business Utilization - **100** points



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation - Cost Proposal Volume II

(See Provision L.26)

- Cost/Price
 - ◆ Not numerically scored
 - ◆ Evaluated to determine probable cost to Government
 - ◆ **Pursuant to NFS 1815.305 evaluated for**
 - Cost realism
 - Determine if cost proposed is realistic
 - Offerors understanding of requirements
 - Consistency with various elements of technical proposal
- Electronic submission of cost data is required
- See Attachment L-6 for Cost templates



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

- Ground rules
 - This presentation is intended to assist potential Offerors in their understanding of the Section L Cost/Price Volume II, Instructions to Offerors.
 - In the event of a discrepancy between this presentation and the solicitation, the SOLICITATION TAKES PRECEDENCE.
 - General clarification questions on the presentation will be responded to; however any other questions must be followed up with a written comment per the instructions in the RFP.



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

- Proposal Page Limitations

Volume II – Cost Factor No Page Limit

Cost information only – NO technical data

- Proposal Format

All Volumes – Submitted in Hard copy and on CD

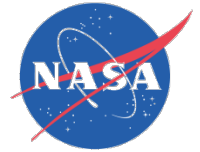
No PDF files, Microsoft Office software



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Volume II – Cost Factor

- Prime & Subcontractor Proposals submitted together
- NOT REQUIRED - Copy of Proposal to Gov Audit Office
– Hard and CD
- Proposals are not Certified – “Other than Cost & Pricing Data” requested
- Team/Subcontractor - \$2 million



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation - Past Performance Volume III

(See Provision L.27)

➤ Past Performance

- ◆ Not numerically scored
- ◆ Used to make assessment
 - How well offeror is likely to perform
- ◆ Government can use information submitted In proposal
- ◆ As well as all other information gathered

➤ See Attachment L-7 (Questionnaire)



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Past Performance – cont'd

- Other elements considered
 - ◆ Past contracts terminated or de-scoped
 - ◆ Past working relationships
 - ◆ Demonstrated work accomplishment of similar work
 - ◆ Commitment to small business, small disadvantaged subcontracting goals and type of work subcontracted
 - ◆ Close attention should be given to section L - 27
 - Early submission of past performance information is requested
 - August 12, 2009 (2 wks prior to proposals)



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Past Performance – cont'd

- Early Submission of Past Performance Information:
 - ◆ Submit per L.15 to contracting officer no later than two weeks before proposal due date



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation - Business Management Volume IV (See Provision L.28)

- Model Contract
- Representations and Certifications
- Standard Form 33 (Solicitation, Offer and Award)
- Listing of exceptions and deviations taken to the RFP will be included in this volume
- Fill ins required for Section B-I, Section J, Section K



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Proposal Preparation - CD Volume V (See Provision L-29)

- All CDs (original + back up) shall be placed in Volume V.
- A cover page shall accompany this volume identifying all CDs (original + back up).
- Prime contractor is responsible for sending in their CDs and their subcontractors.



Research & Technology for Aerospace Propulsion Systems

Proposal Preparation - Small Business Goals

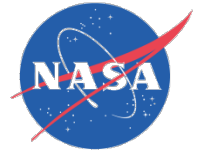
| Small Business Subcontracting | Technology Area 1: Airbreathing Engine Technology | Technology Area 2: Propulsion Airframe Integration – Airframe Sys Tech | Technology Area 3 Integrated Rotorcraft Propulsion – Airframe Sys | Technology Area 4 Space Propulsion Systems | Contract Level Goals |
|--------------------------------------|--|---|--|---|-----------------------------|
| Small Business | 10% | 10% | 5% | 12% | 10.40% |
| SDB | 3% | 3% | 1% | 3% | 2.95% |
| Hub Zone SB | 0.5% | 0.5% | 0.5% | 1% | 0.63% |
| Woman Owned SB | 3% | 3% | 0.5% | 3% | 2.94% |
| Veteran Owned SB | 2% | 2% | 2% | 2% | 2% |
| SDVOSB | 1% | 1% | 1% | 1% | 1% |
| HBCU | - | - | 1% | 1% | 0.28% |



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

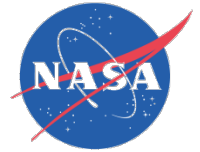
Proposal Preparation - List of Required Plans

- Small and Small Disadvantaged Business Subcontracting Plan – See L.25 Subfactor 3
- Safety and Health Plan – See L.18, Subfactor 2
- Government Property Information – See L.20
- IT Security Plan – due 30 days after contract award



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

TASK ORDER PROCESS



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Task Order Minimum/Maximum

- Each contract awarded will receive task orders valued at \$30,000 – minimum quantity
- Maximum quantity will be contract value based on technology areas awarded



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Contract Task Order Process

- After Contract Award
 - ◆ All tasks over \$3,000 to be competed among Contractors awarded in specific Technology area(s)
 - ◆ Exceptions to competition:
(urgency, highly specialized service, logical follow-on, minimum order)
 - ◆ Clause H.10 Fair Opportunity, Clause H.11 Task Order Solicitation and Selection Procedures and Clause H.12 Task Ordering Procedure will apply after contract award



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Contract Task Order Process- Clause H.11

- Some tasks may have Recovery Act Funding with reporting requirements
 - **Clause I.15 52.204-11 American Recovery and Reinvestment Act—Reporting Requirements (Mar 2009)**
- Aeronautics Research Mission Directorate (ARMD) NASA Research Announcement (NRA) selections will be deemed to have already had competition so long as the ARMD NRA was competitively solicited.
 - ◆ In order for a ARMD NRA selection to be issued as a task under this task ordering procedure, the scope of work under the ARMD NRA selection must be included in the scope of work under the RTAPS scope of work



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Contract Administration

- All costs associated with the planning and preparation of competed task order proposals are unallowable charges to the contract. See Clause – H.17.
- Other costs that are unallowable charges to the contract.
 - ◆ Annual Small Business subcontracting reporting through ESRS government system
 - ◆ Annual NASA Form (NF) 1018, NASA Property in the Custody of Contractors



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Contract Task Order Administration

- All task orders shall include:
 - ♦ Technical Reporting requirements (Monthly, Final, Special reporting) - See Attachment A
 - ♦ Financial Reporting 533M/533Q - See Clause G. 6 and Attachment A
- Mixed Data Rights – See Clause H.23 (Cost sharing Tasks)
- Capital Asset Reporting – See Clause H.24



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Contract Task Order Administration

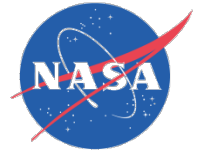
- Upon completion of task order NASA form 1680 will be prepared:
 - Evaluation of contractor performance
 - Contractor will be provided opportunity to review
 - Will be used in future task evaluation



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

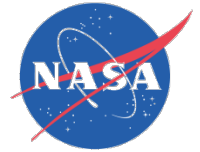
Anticipated Schedule

- Draft RFP comments due 7/1/09
- Issue final RFP 7/15/09
- Past performance proposal due 8/12/09
- Mission suitability and
cost proposal due 8/26/09
- Selection made 10/20/09
- Contract award 12/1/09



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Questions?



Research & **T**echnology for **A**erospace **P**ropulsion **S**ystems

Ground rules for One on One discussions

- Tight Schedule
- Draft RFP questions and comments welcomed
- No hypothetical situations will be addressed
- Final RFP will take precedent
- Time does not permit for all questions, submit comments/questions @ website

<http://rtaps.grc.nasa.gov/>